

## What is claimed is:

[Claim 1] 1. A method of quantifying a presence of a specific kind of microorganism in a sample of material, said method comprising:

(a) culturing the sample under conditions suitable for growth of cultures of the specific kind of microorganism;

(b) using at least one oligonucleotide to detect the presence or absence of the specific kind of microorganism in respective portions of the cultured sample; and

(c) quantifying the presence of the specific kind of microorganism in the sample of material from the detected presence or absence of the specific kind of microorganism in the respective portions of the cultured sample.

[Claim 2] 2. The method as claimed in claim 1, wherein said at least one oligonucleotide hybridizes with a nucleic acid sequence that is indicative of a species of the specific kind of microorganism.

[Claim 3] 3. The method of claim 1, wherein the sample is cultured on a plate of culture media, and the respective portions of the cultured sample are taken from respective colonies of microorganisms that have been found to have grown on the plate of culture media.

[Claim 4] 4. The method of claim 1, wherein the sample is cultured by dividing the sample into multiple portions and culturing each portion, and wherein the presence or absence of the specific kind of microorganism is detected in each cultured portion.

[Claim 5] 5. The method as claimed in claim 4, wherein the sample is divided into the multiple portions by diluting the sample and dividing the diluted sample into the multiple portions.

[Claim 6] 6. The method as claimed in claim 4, wherein the sample is divided into multiple portions by mixing the sample with liquid to produce a fluid mixture, and dividing the fluid mixture into the multiple portions.

[Claim 7] 7. The method as claimed in claim 1, wherein the using of at least one oligonucleotide to detect the presence or absence of the specific kind of microorganism in respective portions of the cultured sample includes detecting the presence or absence of a product of hybridization of said at least one oligonucleotide with a nucleic acid sequence that is indicative of the specific kind of microorganism.

[Claim 8] 8. The method as claimed in claim 1, wherein the using of at least one oligonucleotide to detect the presence or absence of the specific kind of microorganism in respective portions of the cultured sample includes using two oligonucleotide primers that induce a polymerase chain reaction in the presence of nuclear material of the specific kind of microorganism, and detecting the presence or absence of a product of the polymerase chain reaction of the two oligonucleotide primers in the presence of the nuclear material of the specific kind of microorganism.

[Claim 9] 9. The method as claimed in claim 8, wherein one of the oligonucleotide primers hybridizes with a nucleic acid sequence indicative of the genus of the specific kind of microorganism, and another of the oligonucleotide primers hybridizes with a nucleic acid sequence indicative of the species of the specific kind of microorganism.

**[Claim 10]** 10. The method as claimed in claim 8, wherein the detecting of the presence or absence of a product of the polymerase chain reaction of the two oligonucleotide primers in the presence of the nuclear material of the specific kind of microorganism includes performing electrophoresis of polymerase chain reaction products to detect a reaction product having a characteristic molecular length indicative of a polymerase chain reaction of the two oligonucleotide primers in the presence of the nuclear material of the specific kind of microorganism.

**[Claim 11]** 11. The method as claimed in claim 1, wherein the presence of the specific kind of microorganism in the sample of material is quantified in terms of a most probable number of the specific kind of microorganism.

**[Claim 12]** 12. A method of quantifying a presence of a specific kind of microorganism in a sample of material, said method comprising:

- (a) dividing the sample into multiple portions;
- (b) culturing each portion of the sample under conditions suitable for growth of a culture of the specific kind of microorganism;
- (c) performing a polymerase chain reaction process by reacting each cultured portion of the sample successively with two oligonucleotide primers that selectively hybridize with nucleic acid of the specific kind of microorganism to produce a respective reaction product from each cultured portion of the sample;
- (d) detecting the presence or absence of a reaction product having a characteristic length from the reaction of each cultured portion of the sample; and
- (e) quantifying the presence of the specific kind of microorganism in the sample of material from the detected presence or absence of a reaction

product having a characteristic length from the reaction of each cultured portion of the sample.

[Claim 13] 13. The method as claimed in claim 12, wherein the presence of the specific kind of microorganism in the sample of material is quantified in terms of a most probable number of the specific kind of microorganism in the sample of material.

[Claim 14] 14. The method as claimed in claim 12, wherein the sample is diluted prior to the culturing of the portions of the sample so that a good number of the cultured portions of the sample have an absence of a reaction product having the characteristic length.

[Claim 15] 15. The method as claimed in claim 12, wherein the two oligonucleotide primers include one oligonucleotide primer that hybridizes with a nucleic acid sequence indicative of a genus of the specific kind of microorganism, and another oligonucleotide primer that hybridizes with a nucleic acid sequence indicative of the species of the specific kind of microorganism.